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It probably use only a fraction of the y resolution potential. Resolution with any pen is 0.2mm, and drawing speed is 52mm per second.

The graphics commands recognized by the PP40 are nearly as rich and varied as those on much larger and more expensive plotters. The PP40 can produce 15 different types of dotted lines, as well as a solid line. It can also produce coordinate axes automatically.

The draw command (D) draws a line between any number of x,y point pairs, while relative draw (J) draws a line from the present location to an x,y point pair. Move and relative move function similarly, but with the pen up.

The color command (C) selects a pen color, scale set selects one of 64 character sizes, and alpha rotate selects one of four directions for the printing of alphanumeric characters.

The CC40 has three initialization commands: A initializes everything and puts the plotter in text mode; I causes the present pen position to be taken as the starting point; and H moves the pen to the home position with the pen up.

The only bone we have to pick is that the plotter requires that commands and separators (commas) be sent to the plotter enclosed in quotation marks in an LPRINT statement. Most other modern plotters do not require quotes. For example, a draw command between three point pairs must be sent to the PP40 as:

```
80 LPRINT "D": X1,"Y1:", "X2:", "Y2":",0,0"
```

On other plotters, this line would read:

```
80 LPRINT "D" X1,Y1 X2,Y2 0,0
```

As might be expected, the PP40 does not draw true diagonal lines. Instead, these lines are produced as a series of horizontal or vertical straight lines with small steps to create the diagonal direction. These steps are evident in the spiral plot shown in Figure 9.

#### Documentation

The user manual for the PP40 is better than many of the manuals that come with many other Hong Kong products, but it is still nothing to brag about. All the graphics commands are described in a condensed half-page table. Fortunately, the second half of the 38-page manual is devoted to six example plots. Program listings are provided for three computers: Laser/V-Tech 200 (standard Microsoft Basic), Apple II (Applesoft Basic), and Dragon 32 (same as Radio Shack Color Computer). By studying these programs, you should be able to

determine how each text and graphics command functions.

#### The Bottom Line

Frankly, we like the PP40. It is not a professional, full-function plotter, nor does it take the place of a full-size printer. However, as an inexpensive output device that can do both printing and plotting, it does an admirable job.

The graphics command structure is

somewhat cumbersome, diagonal lines are not truly straight, and the documentation could be improved upon. Nevertheless, these are small inconveniences against the good performance, compact size, and low (\$199) cost of the PP40.

For more information, contact Video Technology, 2633 Greenleaf Ave., Elk Grove Village, IL 60007. (312) 640-1776.

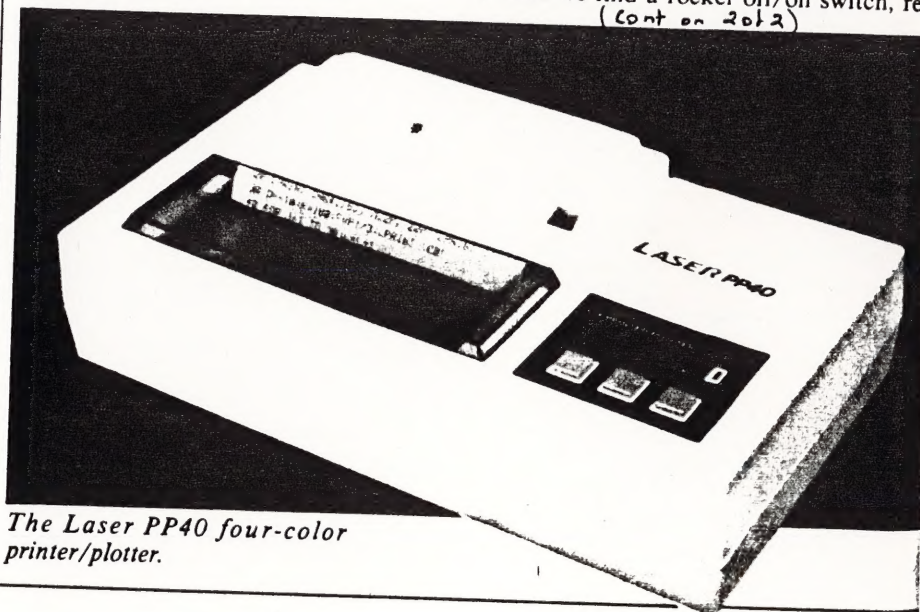
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### Laser PP40 Printer/Plotter

The Laser PP40 is an inexpensive (\$199) four-color printer/plotter from Video Technology. It has a Centronics parallel interface so it is suitable for use with a wide range of computers, not just the machines from Video Technology. It uses 4 1/2" wide roll paper, so it is not suitable for business correspondence; however, for low-cost plotting it is an excellent unit.

The PP40 is one of the smallest printer/plotters we have seen, measuring a diminutive 9.5" x 4.5" x 2.1". An external 8-volt, 1500 ma power supply is also furnished. On the outside of the case we find a rocker off/on switch, red

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The Laser PP40 four-color printer/plotter.

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Figure 6. Character set of Laser PP40 in size 1.

LED power indicator, and three press switches for paper feed, pen change, and color change. On the back are connectors for the power input and Centronics-type interface cable.

To connect the PP40, you will need a cable from your computer with a Centronics-type connector. Some computers such as the Laser 200, Vic-20, TI 99/4A, and Timex/Sinclair 1000 require a separate interface, while on higher-end units this interface is built in.

Paper loading is very simple, as are pen mounting and pen changing. The PP40 comes with one roll of paper and four pens with fine ball tips (black, red, green, and blue). Additional paper rolls are available from office supply dealers, while replacement pens must be purchased directly from V-Tech. Although it is not mentioned in the manual, we suggest removing the pens from the unit and replacing their covers if you plan to let the PP40 stand idle for more than a day or so.

Figure 7. Character set in size 2 and program used to produce it.

```
10 LPRINT "Character Set"
20 LPRINT CHR$(18); "S2": LPRINT CHR$(17)
30 FOR I=32 TO 127
40 LPRINT CHR$(I);
50 NEXT
60 LPRINT: LPRINT CHR$(18); "S1,C0,A"
```

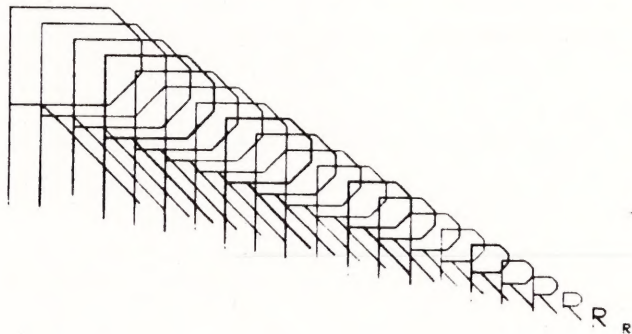
On the bottom of the unit is a small plate that covers a DIP switch. One switch selects whether carriage return implies line feed or not, and the other selects 40- or 80-column printing (spelled on the box, "coloum"). Forty-column printing produces 11 characters per inch and 5.5 lines per inch. Eighty-column printing uses a much smaller character size, and produces twice the vertical and horizontal density (22 cpi and 11 lpi). See Figure 9. Using this character size (0), the print speed is 10 cps; the larger the character, the slower the print speed.

The PP40 has a character set of 95 ASCII characters (see Figure 6). In the

40-column printing mode, characters are produced in size 1. In the graphics mode, the PP40 can produce 64 character sizes; the second size is shown in Figure 7, and sizes 0 to 20 are shown in Figure 8. Size 63 is very large indeed with each letter measuring 2" x 3".

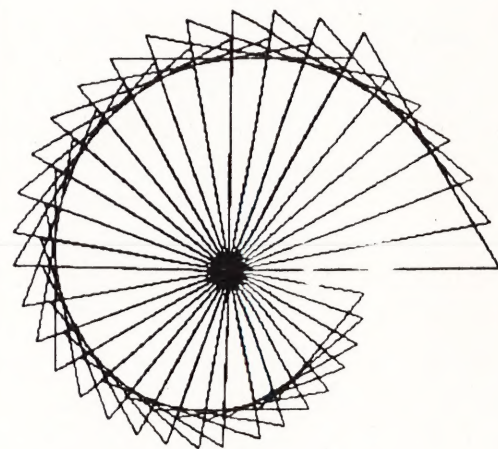
#### Graphics Mode

In the graphics mode, the PP40 can produce plots 96mm (3.7") wide in the x direction by 6.55 meters (over 21 feet!) long in the y direction. The x direction is divided into 480 steps each 0.2mm in size; the y direction can have up to 32,768 steps. In reality, however, you



```
10 LPRINT "Different Character Sizes"
20 LPRINT CHR$(18); "R0,-200"
30 LPRINT "I"
40 FOR I=0 TO 20: LPRINT "HR20,-3"
50 LPRINT "IC"; I; ",S"; 20-I; ",PR"
60 NEXT
70 LPRINT: LPRINT "S1,C0,M0,-20": LPRINT "A"
80 LPRINT: LPRINT "S1,C0,M0,-20": LPRINT "A"
```

Figure 8. The letter R in the first 21 out of 64 character sizes, and the program to produce the plot.



```
10 LPRINT "Spiral Pattern": PI=3.14159
20 LPRINT CHR$(18); "M220,-200": LPRINT "I"
30 D=-10: R=180: F=PI/3: LPRINT "C3"
40 FOR J=1 TO 30
50 D=D+10
60 R=R-3: K=D*PI/180: X1=R*SIN(K): X2=R*COS(K)
70 Y2=R*SIN(K+F): Y2=R*COS(K+F)
80 LPRINT "D"; X1; ",X2"; Y1; ",Y2"; ",0,0"
90 NEXT J
100 LPRINT "M-300,-150": LPRINT "C0,A"
```

Figure 9. A spiral of triangles of decreasing size. The program listing was produced in 80-character text mode with character size 0.